

R E M A R K S

Reconsideration of the present application, as amended, is respectfully requested.

The June 3, 2003 Office Action and the Examiner's comments have been carefully considered. In response, an interview was conducted with Examiner Kao, claim 1 is amended to include the subject matter of claim 3, claims 1, 7, 18 and 20 are amended along the lines as suggested by the Examiner, claims 12-17 are cancelled without prejudice and remarks are set forth below in a sincere effort to place the present application in form for allowance. The amendments are supported by the application as originally filed. Therefore, no new matter is added.

No new issues are raised because the amendments to claim 1 entail the inclusion of the subject matter of claim 3 as well as clarifying amendments suggested by the Examiner and the amendments to claims 7, 18 and 20 are clarifying amendments suggested by the Examiner.

Inasmuch as the present amendment raises no new issues for consideration, and, in any event, places the present application in condition for allowance or in better condition for consideration on appeal, its entry under the provisions of 37 CFR 1.116 are respectfully requested.

SUMMARY OF SUBSTANCE OF INTERVIEW

The courtesies extended by Examiner Kao in granting and conducting a telephonic interview in connection with this application are gratefully acknowledged and appreciated. In the interview, proposed amendments to the claims were discussed and differences between the embodiments set forth in the amended

claims and the prior art cited in the rejections of the claims were mentioned. A formal agreement was not reached.

CLAIM OBJECTIONS

In the Office Action claims 1, 7, 12, 17, 18, and 20 are objected to because of informalities. In response, claims 1, 7, 18 and 20 are amended in a sincere effort to obviate the objections set forth in item 1 on page 2 of the Office Action (claims 12 and 17 are cancelled). In view of the amendment of claims 1, 7, 18 and 20, reconsideration and withdrawal of the objection thereto are respectfully requested.

PRIOR ART REJECTIONS

In the Office Action, claims 1-5, 7 and 12-14 are rejected under 35 USC 103 as being unpatentable over USP 5,751,782 (Yoshitome) in view of USP 5,482,042 (Fujita), USP 4,075,489 (Neal et al.) and USP 6,470,066 (Takagi et al.). Claims 6, 8-10 and 15-17 are rejected under 35 USC 103 as being unpatentable over Yoshitome in view of Fujita, Neal et al., and Takagi et al. and further in view of USP 3,871,360 (Van Horn et al.). Claims 18-21 are rejected 35 USC 103 as being unpatentable over Fujita in view of Yoshitome, Neal et al. and Takagi et al.

Claims 1-10

The Examiner's rejection of claims 1-10 is respectfully traversed in view of amendments to independent claim 1.

Specifically, claim 1 is amended to include the features of claim 3 (now cancelled) and thus recites the steps of successively moving the X-ray device to all of the X-ray positions in an X-ray cycle, successively completing a plurality

of X-ray cycles, and controlling the movement of the X-ray device by means of the motion signal such that each X-ray cycle commences in a different phase of motion of the organ. These features are discussed in the specification at page 6, lines 11-25 and is shown by the two X-ray cycles R_1 and R_2 in Fig. 4. An advantage obtained by commencing or starting each cycle at a different phase of motion of the organ is that it enables the X-ray device to be in each position during the low-motion phase of the organ. The fact that each cycle commences at a different phase of motion implies that there is a discrete beginning and end to each cycle.

Yoshitome, Fujita, Neal et al and Takagi et al, taken individually or in combination, do not disclose, teach or suggest the features now set forth in claim 1.

Yoshitome shows an apparatus wherein a signal representative of the organ phase is used to periodically trigger acquisition of projection data sets. As admitted by the Examiner, Yoshitome does not disclose controlling movement of an X-ray device by means of a motion signal such that each of a plurality of X-ray cycles commences in a different phase of motion of an organ. Fujita, Neal et al. and Takagi et al. also do not disclose, teach or suggest this feature.

The Examiner referred to Fig. 4 of Yoshitome as "another embodiment" wherein each cycle commences in a different phase of motion of the organ.

However, Fig. 4 in Yoshitome exemplifies a conventional (prior art) apparatus wherein the start of the rotation is varied to cause correspondence between a measuring time and a desired image range. A delay time d and a measuring time e are fixed

thereby requiring the start time of the rotation to vary to obtain images of the various ranges.

Yoshitome is directed to a fundamentally different concept than the admitted prior art embodiment wherein the start time of the rotation is varied. In fact, Yoshitome contrasts his invention with the prior art shown in Fig. 4 in that in the prior art, the rotation of the X-ray tube and detector are stopped between successive rotations, whereas in Yoshitome, a continuous rotation is provided without any stopping between rotations (see col. 1, lines 57-63 and col. 2, lines 10-16). In Yoshitome, images for the different ranges are obtained by providing a shorter measuring time than the period of motion so that as the X-ray tube rotates, in each rotation, a different segment is imaged.

Since Yoshitome discloses only a continuous rotation, it is not possible to control the movement of the X-ray device to cause each of a plurality of X-ray cycles to commence in a different phase of motion as argued by the Examiner since there is only a single start time and a single end time and continuous rotation therebetween. Thus, it is not possible to modify the apparatus of Yoshitome to have a plurality of cycles with each cycle commencing in a different phase as set forth in claim 1, while maintaining the essence of the Yoshitome apparatus, i.e., a continuous rotation.

Thus, Yoshitome, Fujita, Neal et al. and Takagi et al. do not disclose all of the features of amended claim 1 and cannot be combined in any manner to render the claimed embodiment of the invention obvious.

Claims 2 and 4-10 are patentable over Yoshitome, Neal et al., Takagi et al. and Fujita in view of their dependence on

claim 1 and because the prior art references do not disclose, teach or suggest all of the limitations recited in the dependent claims.

Claims 6 and 8-10 are separately patentable over Yoshitome, Takagi et al., Neal et al., Fujita in combination with van Horn et al. because van Horn et al. does not disclose, teach or suggest successively moving an X-ray device to all of a plurality of X-ray positions in an X-ray cycle, successively completing a plurality of X-ray cycles, and controlling the movement of the X-ray device by means of the motion signal such that each X-ray cycle commences in a different phase of motion of the organ as set forth in claim 1.

Claims 12-17

Although the applicant disagrees with the rejections of these claims, these claims have been cancelled without prejudice to filing a continuation application directed to the subject matter of these claims.

Claims 18-21

The Examiner's rejection of claims 18-21 is respectfully traversed because the cited prior art does not disclose, teach or suggest moving an X-ray device to each of a plurality of different positions which are "defined" and situated in a common plane (e.g., represented by positions P_0 to P_{16} as shown in Fig. 2), and when the X-ray device is in each defined position, determining whether a low-motion phase of a motion signal is present and if so, acquiring a projection data set as set forth in independent claim 18. The same positions can be used for every patient for every examination and are selected to ensure that a

complete three-dimensional image data set can be obtained from projection data sets acquired at each position (see the sentence in the specification bridging pages 2 and 3).

Fujita describes a method for acquiring a medical image in which a plurality of scans are obtained when a patient is holding his breath. Scanning stops when the patient takes a breath and resumes when the patient again holds his breath. Thus, a series of scans is obtained only when the patient is holding his breath. The start and end times of each scan depend on the patient's breathing and are not and cannot be defined or predetermined. As such, the position of the X-ray device when the patient takes a breath is not defined prior to the examination and varies for every examination and for every patient.

In contrast to the embodiment of the invention set forth in claim 18, in Fujita, there are no defined positions of the X-ray device whereby when the X-ray device is at each position, projection data sets are obtained only when a low-motion phase of the organ is occurring. Fujita thus does not disclose that from the projection data sets acquired at each position, a three-dimensional image data set can be obtained. Indeed, it may be the case that the scans of Fujita at the positions determined based on the breathing of the patient do not provide a complete image set as the positions are entirely arbitrary.

Yoshitome, Neal et al. and Takagi et al. also do not disclose, teach or suggest movement of an X-ray device to a plurality of defined positions and acquiring a projection data set at each position during a low-motion phase of the organ.

Thus, Fujita, Yoshitome, Neal et al. and Takagi et al. do not disclose all of the features of claim 18 and cannot be

combined in any manner to render the claimed embodiment of the invention obvious.

Claims 19-21 are patentable over Fujita, Yoshitome, Neal et al. and Takagi et al. in view of their dependence on claim 18 and because the prior art references do not disclose, teach or suggest all of the limitations recited in the dependent claims.

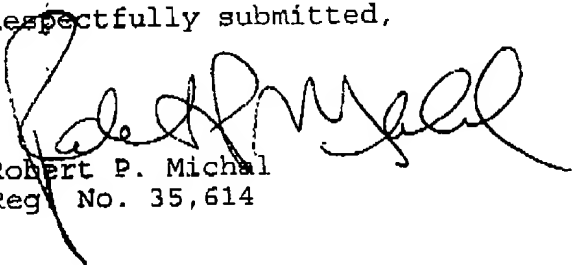
In view of the foregoing, claims 1, 2, 4-10 and 18-21 are patentable over Yoshitome, Neal et al., Fujita, Takagi et al. and van Horn et al. under 35 USC 102 as well as 35 USC 103.

If the Examiner disagrees with any of the foregoing, the Examiner is respectfully requested to point out where there is support for a contrary view.

Entry of the amendment, allowance of the claims, and the passing of the application to issue are respectfully solicited.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned at the telephone number given below for prompt action.

Respectfully submitted,


Robert P. Michal
Reg. No. 35,614

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Frishauf, Holtz, Goodman & Chick, P.C.
767 Third Avenue - 25th Floor
New York, New York 10017-2023
Tel. No. (212) 319-4900
Fax No. (212) 319-5101
RPM/nps

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